

Iodine Content in Infant Formula
Frequently Asked Questions for Healthcare Professionals
(updated on 13 August 2012)

Concerns of Locally Available Infant Formula

1.1 Why was the survey conducted?

The Centre for Food Safety (CFS) has embarked on a two-year programme to test the nutritional composition of infant and follow-up formula available in the local market and planned to collect 48 products for laboratory testing in 2012-2013.

1.2 How was the survey done?

At present, there are about 40 brands encompassing about 60 infant formula products in the retail market according to the latest available information. In May 2012, the first batch of 14 products intended for infants aged 0 to 6 months or older were taken for analysis of their nutritional composition.

1.3 What are the salient findings of the first round of survey?

Among the 14 products analysed, results of iodine content of 6 were found not complied with the Codex standard. Codex is an internationally recognised organisation which develops harmonised international food standards to protect the health of the consumers and ensure fair trade practices in the food trade.

Taken into consideration the World Health Organization (WHO)'s recommended daily iodine intake level, CFS is of the view that 2 of the 6 products, namely Wakodo 和光堂初生嬰兒奶粉 and Morinaga 森永初生嬰兒奶粉, would pose public health risks to **exclusively formula-fed infants** who would rely solely on the formulae due to iodine deficiency.

To overcome the limitation of a possible within lot variation of the nutrient content, the CFS had collected further samples of each of the two alleged Japanese infant formulae, namely Wakodo and Morinaga, for a repeated testing. The results reported on 6 August found that Wakodo contained iodine of 94µg/kg and Morinaga contained iodine of 180µg/kg.

Such results indicated that **exclusively feeding** an infant **0-6 months** old of an average weight with the alleged Wakodo product, according to the manufacturer's instruction, may increase his/her risk of subclinical hypothyroidism, and the risk of brain damage.

Such results indicated that **exclusively feeding** an infant **4-6 months old** of an average weight with the alleged Morinaga product, according to the manufacturer's instruction, may increase his/her risk of subclinical hypothyroidism, and the risk of brain damage.

In view of the fact that, out of the first batch of 14 samples analysed, two Japanese infant formula samples were detected with rather low iodine content and may have impact on infants' thyroid function, the CFS has stepped up sampling of powdered formulae catered for infants below six months old available in the market for testing on their iodine content

Iodine for Infants

2.1 What is iodine and what is its function?

Iodine is an essential nutrient used for the synthesis of thyroid hormones by the thyroid gland. The dietary requirement of iodine is determined by normal thyroxine (T4) production by the thyroid gland without stressing the thyroid iodide trapping mechanism or raising thyroid stimulating hormone (TSH) levels.

According to WHO, the physiological actions of thyroid hormones can be categorized as 1) growth and development and 2) control of metabolic processes in the body. Thyroid hormones play a major role in the growth and development of the brain and central nervous system in the foetus and young children 3 years of age.

The other physiological role of thyroid hormones is to control several metabolic processes in the body. These include carbohydrate, fat, protein, vitamin, and mineral metabolism. For example, thyroid hormones increases energy production, increases lipolysis, and regulates neoglucogenesis, and glycolysis.

2.2 What are the sources of iodine for infants?

In the fetal stage iodine is transferred from the mother to the foetus. The iodine content

of the foetal thyroid gland increases from $<2\mu\text{g}$ at 17 weeks of gestation to $300\mu\text{g}$ at full term.¹ Following delivery, the colostrum provides a rich source of iodine in an iodine concentration of approximately $200\text{--}400\mu\text{g/L}$. It decreases during the next few weeks and remains steady in mature milk. The median concentration of mature milk of 146, 121, 92 and $146\mu\text{g/L}$ have been reported from the USA, Iran, Sweden and China, respectively.² Therefore, before the introduction of complementary food (i.e. weaning or transition to solid foods, normally at around 6 months of age), breastmilk is the only food source of dietary iodine for exclusively breast-fed infants. If infant formula has been chosen to partially or wholly replace breastmilk, the iodine content in the infant formula will affect the dietary iodine intake of the infant.

During weaning, the sources of dietary iodine of the infants will depend on the foods taken, including breastmilk (or infant formula) and the complementary foods.

Small amount of iodine is present in local tap water (about $10\mu\text{g/L}$). Certain foods such as marine fish and seaweed are naturally relatively rich in iodine.

2.3 How much iodine is needed for infants?

WHO recommends dietary intakes of iodine for infants aged 0-12 months at $15\mu\text{g/kg}$ body weight/day (i.e. $90\mu\text{g/day}$, assuming a 6-month infant weighing 6 kg or $15\mu\text{g/kg}$ body weight/day). Nevertheless, subclinical hypothyroidism may occur when the iodine intake is about one third of this value (ie. $5\mu\text{g/kg}$ body weight/day).

2.4 What are the health risks in infants of insufficient iodine intake for prolonged period of time?

According to WHO, thyroid hormones play a major role in the growth and development of the brain and central nervous system in humans from the 15th week of gestation to 3 years of age. If iodine deficiency exists during this period and results in a significant degree of thyroid hormone deficiency, then derangement in the development of the brain and central nervous system cannot be ruled out. These derangements are irreversible; the most serious form being that of cretinism.

Existing data point to an iodine requirement of the young infant of $15\mu\text{g/kg}$ body

¹ Delange F. Iodine requirements during pregnancy, lactation and the neonatal period and indicators of optimal iodine nutrition. *Public Health Nutrition*: 10(12A), 1571–1580.

² (2) Azizi F, Smyth P. Breastfeeding and maternal and infant iodine nutrition. *Clinical Endocrinology* (2009)70, 803–809

weight/day (30µg/kg body weight/day in pre-term infants). Hyperthyrotropinaemia (high levels of serum TSH), indicating subclinical hypothyroidism with potential risk of brain damage, occurs when the iodine intake is about one third of this value (5µg/kg body weight/day), and dramatic neonatal hypothyroidism, resulting in endemic cretinism, occurs when the intake is about one tenth of this value (1.5µg/kg body weight/day).

The effect of iodine deficiency at different stages of life is given below:

Fetus:	Abortions, Stillbirths, Congenital anomalies, Increased perinatal mortality, Increased infant mortality, Neurological cretinism (mental deficiency, deaf mutism, spastic, diplegia, and squint), Myxedematous cretinism (mental deficiency, hypothyroidism and dwarfism), Psychomotor defects
Neonate:	Neonatal goiter, Neonatal hypothyroidism
Child and adolescent:	Goitre, Juvenile hypothyroidism, Impaired mental function, Retarded physical development

However, the effects of iodine deficiency on the development of goiter and thyroid hypofunction are extremely variable among populations and individuals, even in endemic areas. The dietary, environmental, and/or genetic factors may have accounted for this variability in the expression of iodine deficiency.

2.5 How much iodine is in breastmilk?

According to literature, the iodine content of breastmilk varies markedly as a function of the iodine intake of the population, which is affected by the iodine content in the diet being consumed, and whether there is iodine fortification policy. It can vary from tens to thousands of micrograms per liter of breastmilk. For example, it ranges from 20 to 330µg/L in Europe and from 30 to 490µg/L in the United States. It is as low as 12µg/L in populations experiencing severe iodine deficiency. On the other hand, breastmilk iodine concentration has been reported to be in the range of 77-3947µg/L in Japan and 892-2170 µg/L in Korea.

Currently, there is very limited data on the iodine content in breastmilk of Hong Kong lactating women.

Mothers should consume iodine rich food such that their babies can obtain adequate iodine from breastmilk (please refer to leaflet on “Meeting the increased demand for iodine in Pregnant and lactating mothers”

http://www.fhs.gov.hk/english/health_info/files/iodine_7.8.2012_11pEN.pdf,).

2.6 How can I know the iodine content in infant formula?

The iodine content in infant formulae available in the market may vary from brand to brand. The FEHD had tested iodine content of some infant formula and posted the results on its website (<http://www.cfs.gov.hk/cindex.html>). Some yielded adequate levels of iodine that fulfil the requirement of Codex of 10 – 60 µg in every 100 kcal of food. Generally, the iodine content of an infant formula is declared on the container. Use the nutrition labelling on the product to find out its iodine content. Refer to the section on [Iodine Content Requirements in Infant Formula](#) to check the iodine content of an infant formula.

2.7 Would there be any difference in the iodine content in the prepared liquid infant formula milk if bottled distilled water or boiled tap water was used when preparing it?

It has been revealed from laboratory analysis that small amount of iodine (about 10 µg/L) is present in local tap water whereas iodine is not detected in bottled distilled water. As such, using boiled tap water to prepare infant formula will add extra iodine in the prepared liquid infant formula milk.

2.8 Where can I find more information about nutrition for lactating women and infants?

You can visit the CFS website on the Risk Assessment Report of the Dietary Iodine Intake in Hong Kong Adults at http://www.cfs.gov.hk/english/programme/programme_rafs/programme_rafs_n_01_12.html or the Department of Health's Family Health Services website on infant nutrition at http://www.fhs.gov.hk/english/health_info/class_topic/ct_child_health/ch_nutrition.html

Iodine Content Requirements in Infant Formula

3.1 What is an infant formula?

An infant means a person not more than 12 months of age. An infant formula is a breastmilk substitute consumed by infants during the first months of life up to the

introduction of complementary feeding. The product by itself can satisfy the nutritional requirements of a normal infant for its growth and development.

3.2 Is there any standard for the content of iodine in infant formula?

The Codex “Standard for Infant Formula and Formulas for Special Medical Purposes Intended For Infants (Codex Stan 72-1981)” stipulates that infant formula prepared ready for consumption in accordance with instructions of the manufacturer shall contain iodine 10-60 µg/100kcal (2.5-14 µg/100kJ).

3.3 As most of the locally available infant formulae are imported, do they have the same iodine content?

The iodine content in infant formulae available in the market may vary from brand to brand. Codex requires the iodine content in infant formula to be within 10 to 60µg per 100kcal provided by the product. However, iodine content requirement of infant formula varies in different jurisdictions. For example, Japan has not established specific legal requirement for iodine content in infant formula while the minimal iodine content required in US, Canada, Singapore, Korea, Australia and New Zealand is about 5µg per 100kcal. The below table shows the Codex and overseas requirements on iodine content in infant formula:

Codex and other jurisdictions	Iodine content in infant formula
Codex	10 to 60µg/100kcal
US	5 – 75 µg/100kcal
Canada, Singapore and Korea	At least 5 µg/100kcal
Australia and New Zealand	1.2 – 10 µg/100kJ (~ 5 – 42 µg/100kcal)
EU	10 – 50 µg/100kcal
Japan	No specific requirement

3.4 What is the local regulation on the level of iodine in infant formulae?

Currently there is no specific local legislation on the level of iodine in foods including infant formulae. However, as stipulated in Section 54 of Cap. 132 of the Public Health and Municipal Services Ordinance, it is an offence to sell or offer for sale any food unfit for human consumption.

3.5 Which infant formulae have been tested by CFS with iodine level below the Codex requirement and with public health concern?

The first two alleged infant formulae that have raised public health concern are:

Product name	Country of Manufacture	Best before	Iodine tested (results on 6 August 2012)	Target consumer
Wakodo 和光堂初生嬰兒奶粉	Japan	2012-8-4	94µg/kg* (about 1.81µg/100kcal)	0-9 months
Morinaga 森永初生嬰兒奶粉	Japan	2012-12-13	180 µg/kg** (about 3.51µg/100kcal)	0-9 months

*Calculated based on the information on the nutrition label of Wakodo 和光堂初生嬰兒, each 100g of the product contains 518kcal.

** Calculated based on the information on the nutrition label of Morinaga 森永初生嬰兒奶粉, each 100g of the product contains 513kcal.

For information on the results of subsequent rounds of testing and other products, please refer to press release and updated information at the CFS website:

http://www.cfs.gov.hk/english/consumer_zone/foodsafety_Iodine_in_infant_formula.html.

3.6 Has any clinical cases been identified?

There was no apparent increase in clinical cases of iodine deficiency in recent years. The health implication concerning the intake of formula with low iodine level will be further investigated.

3.7 What is the likelihood of inadequate intake of iodine for infants consuming the above infant formulae?

Taking into account the feeding instruction of each product, the average body weight of local 0-6 months boys and girls, and the average iodine content in local tap water, it is revealed that, the iodine intake for infants solely fed on some of the products might be below one-third of the WHO recommendation of 15 µg/kg body weight/day that may pose public health risk to 0-6 months baby.

3.8 What advice should I give to parents/ caretakers with babies consuming the concerned infant formula?

If their baby is solely relying on the concerned infant formula, they should stop feeding him/her with it. Parents should stop feeding their baby with the concerned infant formulae as the one CFS tested. You should advise them to consider switching to another brand of infant formula until further evaluation is available. They can visit the Department of Health (DH) website on information for parents with children who have consumed the alleged infant formula (http://www.dh.gov.hk/iodine/affected_babies_eng.pdf) and notes on switching milk formulae for babies (http://www.dh.gov.hk/faq2_eng.html).

If their baby is between 6-12 months, parents should include foods that are rich in iodine (e.g. marine fish, egg yolk) as part of the complementary foods to ensure the child has adequate iodine intake (refer to Q2.8). Iodised salt is not recommended for baby 12m or below. Parents can also switch to another brand of infant formula or follow on formula that meets the Codex recommendation.

If breastmilk is part of the baby's food, encourage the lactating mothers to consume more iodine rich foods and replace non-iodised salt with iodised salt (daily salt/sodium intakes from all sources should be below 5g salt or 2000mg sodium) when cooking. If necessary, lactating mothers with low iodine intake could also be provided with iodine supplementation.

Codex requires infant formula to contain 10 to 60 µg/100 kcal iodine. For an average infant formula providing energy of 500 kcal per 100g powder, an iodine content of at least 50 µg per 100g powder can roughly meet the Codex requirement. For infants with special nutrition requirement, advice will be on a case-by-case basis.

CFS has set up hotlines 3978 0600 (Monday to Friday: 9:00am – 10:00pm; Saturday, Sunday and Public Holiday: 9:00am – 9:00pm; Voice mail service will be provided beyond these hours) for enquiry by the public on the concerned food products; DH has provided phone enquiries at 21251111 (daily 9:00 am to 9:00 pm) for parents whose children might have taken the products concerned.

3.9 If parents/ caretakers have been feeding their baby with the concerned infant formula, how to tell if the baby has iodine deficiency? Are there any symptoms?

Our body has compensatory mechanisms to maintain thyroid hormones within a normal range. The effects of iodine deficiency on the development of hypothyroidism are extremely variable among population and individuals. If iodine deficiency is so severe as to affect the formation of thyroid hormones, the infant may develop signs and symptoms of hypothyroidism.

Hypothyroidism may be suspected if a child is having symptoms. However, some children may have no symptoms at all.

The following symptoms may be observed in newborns or very young infants with hypothyroidism:

- Prolonged jaundice
- Feeding difficulty
- Lethargy
- Umbilical hernia
- Macroglossia (large tongue)
- Constipation
- Cold or mottled skin
- Low body temperature

In case of suspicion, the condition can be confirmed by checking blood for thyroid hormones. Doctors may also order other investigations such as thyroid scan, ultrasound of thyroid, blood test for thyroid antibodies and bone age depending on the child's clinical conditions.

Comparison of the Iodine Content in Infant Formula with Codex standards

4.1 How to tell if the iodine content of an infant formula fulfills the Codex requirement?

Read the nutrition labels on the container of infant formula. If the iodine content is listed as “Per 100 kcal”, “Per 100 kJ”, “Per 100 g of milk powder” or “Per 100 ml of reconstituted milk”, you can then follow the steps in the below questions to get the iodine content in each 100kcal or 100kJ of food, and compare it with the Codex standards. Before comparison, make sure the unit of iodine is marked as “µg” or “mcg”

(1mg = 1000µg= 1000 mcg).

Energy Content of Food	Codex's Standard for Iodine
Per 100 kcal	10 – 60 µg
Per 100 kJ	2.5 – 14 µg

4.2 How to tell if an infant formula fulfills the Codex standard when the iodine content is listed as “Per 100 kcal” of food?

If the iodine content is listed as “Per 100 kcal” of food, such as the partial nutrition label on the container of “Brand A” infant formula shown below, you can compare the iodine content with the Codex standard directly.

營養資料 Nutrition Information		
	單位 Unit	Per 100 kcal 每 100 千卡
蛋白質 Protein	克 g	XX
脂肪 Fat	克 g	XX
碳水化合物 Carbohydrates	克 g	XX
...
...
碘 Iodine	微克 µg	30

According to the above nutrition label, per 100 kcal of Brand A infant formula contains 30 µg of iodine, which **fulfills** the requirement of Codex of 10 – 60 µg in every 100 kcal of food.

4.3 How to tell if an infant formula fulfills the Codex standard when the iodine content is listed as “Per 100 kJ” of food?

If the iodine content is listed as “Per 100 kJ” of food, such as the partial nutrition label on the container of “Brand B” infant formula shown below, you can compare the iodine content with the Codex standard directly.

營養資料 Nutrition Information		
	單位 Unit	Per 100 kJ 每 100 千焦
蛋白質 Protein	克 g	XX
脂肪 Fat	克 g	XX
碳水化合物 Carbohydrates	克 g	XX
...
...
碘 Iodine	微克 µg	6

According to the above nutrition label, per 100 kJ of Brand B infant formula contains 6 µg of iodine, which **fulfills** the requirement of Codex of 2.5 – 14 µg in every 100 kJ of food.

4.4 How to tell if an infant formula fulfills the Codex standard when the iodine content is listed as “Per 100 g of milk powder”?

If the iodine content is listed as “Per 100 g of milk powder”, such as the partial nutrition label on the container of “Brand C” infant formula shown below, you **must do the conversion first** before comparing the converted iodine content to the Codex standard.

營養資料 Nutrition Information		
	單位 Unit	每 100 克的奶粉 Per 100 g of Powder
能量 Energy	千卡 kcal	486
蛋白質 Protein	克 g	XX
脂肪 Fat	克 g	XX
碳水化合物 Carbohydrates	克 g	XX
...
...
碘 Iodine	微克 µg	200

According to the above nutrition label, per 100 g of brand C infant formula contains 200 µg of iodine and 486 kcal of energy.

$$\begin{aligned}
 \text{Iodine content per } & \\
 100 \text{ kcal of food} &= \frac{\text{Iodine content per 100 g of powder}}{\text{Energy content per 100 g of powder}} \times 100 \text{ kcal} \\
 &= \frac{200 \mu\text{g}}{486 \text{ kcal}} \times 100 \text{ kcal} \\
 &= 41 \mu\text{g}
 \end{aligned}$$

Per 100 kcal of Brand C infant formula contains 41 µg of iodine, which **fulfills** the requirement of Codex of 10 – 60 µg in every 100 kcal of food.

4.5 How to tell if an infant formula fulfills the Codex standard when the iodine content is listed as “Per 100 ml of reconstituted milk”?

If the iodine content is listed as “Per 100 ml of reconstituted milk”, such as the partial nutrition label on the container of “Brand D” infant formula shown below, you **must do the conversion first** before comparing the converted iodine content to the Codex standard.

營養資料 Nutrition Information		
	單位 Unit	每 100 毫升已沖調的奶水 Per 100 ml of Reconstituted Milk
能量 Energy	千焦 kJ	350
蛋白質 Protein	克 g	XX
脂肪 Fat	克 g	XX
碳水化合物 Carbohydrates	克 g	XX
碘 Iodine	微克 µg	5

According to the above nutrition label, per 100 ml of Brand D **reconstituted milk** contains 5 µg of iodine and 350 kJ of energy.

$$\begin{aligned}
 \text{Iodine content per} &= \frac{\text{Iodine content per 100 ml of reconstituted milk}}{\text{Energy content per 100 ml of reconstituted milk}} && \times 100\text{kJ} \\
 100 \text{ kJ of food} &= \frac{5 \mu\text{g}}{350 \text{ kJ}} && \times 100\text{kJ} \\
 &= 1.4 \mu\text{g}
 \end{aligned}$$

Per 100 kJ of Brand D infant formula contains 1.4 µg of iodine, which is **lower** than the requirement of Codex of **2.5 – 14 µg** in every 100 kJ of food.

4.6 For products not meeting Codex requirements, does it mean that the consumer’s

health is at risk?

Codex develops harmonised international food standards to protect the health of the consumers and ensure fair trade practices in the food trade. However, Codex only specifies the desirable level of iodine in food. Detected level below Codex standard does not necessarily mean the consumer's health is at risk. When assessing whether a product may pose health risk to the targetted consumer, risk assessment study has to be carried out, taking into account of: feeding instruction of each product, iodine content in local boiled tap water (10µg/L) and average body weight of local infants.

Comparison of the Iodine Content in Infant Formula with WHO daily iodine intake requirement

5.1 What is WHO daily iodine intake requirement for infants 0-6 months?

According to WHO, positive iodine balance in the young infant, which is required for increasing the iodine stores of the thyroid, is achieved only when the iodine intake is at least 15µg/kg body weight/day in term infants and 30µg/kg body weight/day in preterm infants. The iodine requirement of preterm infants is twice that of term infants because of a much lower retention of iodine by preterm infants.

5.2 How to compare the iodine content declared on the container of the infant formula listed as “Per 100 g of milk powder” with the WHO’s daily iodine intake requirement for infants 0-6 months?

Read the nutrition label on the container of infant formula. If the iodine content is listed as “Per 100 g of milk powder” and if boiled tap water (about 10 µg/L) is used to reconstitute the formula, the iodine intake from formula and water (µg/kg BW/day) will be:

$$\frac{\left(\begin{array}{l} \text{Iodine content in} \\ \text{powder formula} \\ (\mu\text{g}/100\text{g}) \end{array} \times \begin{array}{l} \text{Amount of} \\ \text{powder consumed} \\ \text{per day (g)} \end{array} \div 100 \right) + \left(\begin{array}{l} \text{Volume of diluted} \\ \text{milk consumed} \\ \text{per day (liter)} \end{array} \times 10 \right)}{\text{Body weight of infant (kg)}}$$

If the outcome is ≥ 15 , then the iodine content of the product meets WHO recommendation.

Remarks:

- **Amount of powder consumed per day** could be calculated with reference to the feeding table on the package = no. of scoops of powder x weight of 1 scoop powder (g) x no. of feeding per day
- **Volume of diluted milk consumed per day** could be calculated with reference to the feeding table on the package = volume of diluted milk per feed (litre) x no. of feed per day (note: 1 litre = 1000 ml)
In case the volume of diluted milk per feed is not provided, the volume of water to be used to dilute the milk in each feed could be used instead.

5.3 How to compare the iodine content declared on the container of the infant formula listed as “Per 100 ml of reconstituted milk” with the WHO’s daily iodine intake requirement for infants 0-6 months?

Read the nutrition label on the container of infant formula. If the iodine content is listed as “Per 100 ml of reconstituted milk”, the iodine intake from the formula ($\mu\text{g}/\text{kg BW}/\text{day}$) will be:

$$\frac{\left(\begin{array}{l} \text{Iodine content in formula} \\ \text{after reconstitution} \\ (\mu\text{g}/100\text{ml}) \end{array} \times \begin{array}{l} \text{Amount of formula} \\ \text{after reconstitution} \\ \text{consumed per day (g)} \end{array} \div 100 \right) + \left(\begin{array}{l} \text{Volume of} \\ \text{diluted milk} \\ \text{consumed per} \\ \text{day (liter)} \end{array} \times \mathbf{10} \right)}{\text{Body weight of infant (kg)}}$$

If the outcome is ≥ 15 , then the iodine content of the product meets WHO recommendation.

Likely questions from parents

6.1 If my child has a low intake of iodine, will he be having hypothyroidism?

Not necessarily. The body has a lot of compensatory mechanism to maintain the thyroid hormones at normal level. The effects of iodine deficiency on the development of hypothyroid or a state of low thyroid hormones are extremely variable among population and individual. Undefined genetic variation is likely the explanation. However, it was reported that in population with a severe deficiency ($<20\text{mcg}/\text{day}$), the prevalence of goiter is high and there is a sharp increase in proportion of children

suffering from hypothyroidism and its complication increases compared to areas where the intake of iodine is considered adequate.

6.2 Who are at risk?

- Infants of 1-8 months who have been exclusively fed with the alleged products since birth will be at relatively higher risk.
- Infants less than one month old have iodine reserve from mothers and the risk of iodine deficiency resulting from intake of these formulae for a short period is relatively low.
- Infants older than eight months should have had additional iodine intake from complementary food and/or cow's milk and their risk of iodine deficiency would decrease.

6.3 My 9-month baby has been taking the problem formula since birth. Does he need any investigation?

Since your baby has commenced eating solid foods, he should have iodine intake from other food sources. The risk of having abnormal thyroid function becomes relatively low. He may not need a blood test.

6.4 If the blood investigation is normal, does it mean that my baby is not affected? Will there be other adverse effects which may present later?

As iodine deficiency will manifest through its effect on the thyroid gland and its function, if your baby's thyroid function has been affected, he/she may have an abnormal test now. Provided your child maintains an adequate iodine intake from now on, it is unlikely his thyroid problem due to iodine deficiency will appear later on.

6.5 What is the minimal duration of consumption of the concerned formulae for my baby to be affected?

One cannot tell. Our body has compensatory mechanisms to maintain thyroid hormones within a normal range even if the iodine intake is much lower than recommended. The effects of iodine deficiency on the thyroid gland are extremely variable among population and individuals. In a study of a group of preterm infants (gestational age ranged from 27 to 36 weeks) fed on formula milk with inadequate iodine content for a period of one to two months, although they had lower serum T3 and FT4 values and higher TSH and

thyroglobulin levels than infants with higher iodine intakes, these values were still within the normal range.³

6.6 Does my baby need any supplement?

If your baby is 6 months or above, she can attain the recommended intake of iodine of 90µg/day by (1) consuming a formula milk that meets the Codex standard for iodine level, (2) eating egg yolk and marine fish frequently, (3) consuming occasionally congee / rice / soup cooked with a small piece of kelp, say once every 2 to 3 weeks.

6.7 How can my 8-month old baby take adequate iodine from his diet?

Apart from solid food, most 8-month-old babies still need at least 600 ml of formula milk. Choose formula with iodine level that meets the Codex requirement. Provide a variety of iodine rich foods, such as egg yolk (1 egg yolk provides 20µg iodine), or marine fish everyday. Once every 2-3 weeks, prepare the congee/rice with a small sheet of kelp. For details, please refer to the factsheet on “How can my baby (6 months or older) have adequate iodine intake” (http://www.dh.gov.hk/iodine/adequate_iodine_intake_eng.pdf)

Centre for Food Safety (FEHD)

Department of Health

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³ Ares S, Quero J, Duran S, et al. Iodine Content of Infant Formula and Iodine Intake of Premature Babies: High Risk of Iodine Deficiency Arch Dis Child 1994; 71: F184-F191